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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/992,462	11/16/2001	Chris W. Hill	98090DIV	8205

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EXAMINER	
SOWARD, IDA M	

ART UNIT	PAPER NUMBER
2822	

DATE MAILED: 03/14/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/992,462	Applicant(s) HILL, CHRIS W.
	Examiner Ida M Soward	Art Unit 2822

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 December 2002* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-31* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-31* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

This Office Action is in response to the preliminary amendment filed November 16, 2001.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-5, 14 and 16-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Admitted Prior Art Figure 9 in view of Chou et al. (5,861,345) and Park et al. (5,656,337).

Admitted Prior Art Figure 9 teaches a method of forming a dielectric layer in an opening, comprising: forming a dielectric layer **102** in the opening **118** on the substrate; the opening having an aspect ratio greater than about two, wherein a portion of the opening not filled with the dielectric layer has an aspect ratio of not greater than about two; providing a substrate before forming the opening; forming a dielectric layer having a top surface that is not within the opening; forming a dielectric layer having a top surface that is within the opening; and forming a plurality of conductive structures **112** on the substrate so that the plurality of structures forms an opening. However, Prior Art Figure 9 fails to teach forming a second dielectric layer over the first dielectric, the

second layer having a top surface that is not width within the opening. Chou et al. teach forming a second dielectric layer **126** over a first dielectric **124**; the second layer having a top surface that is not width within the opening; and a silicon substrate (Figures 3A-3C, col. 4, lines 22-56). Park et al. teach a dielectric layer at with one deposition rate greater than another deposition rate (claim 6). Since Admitted Prior Art Figure 9, Chou et al. and Park et al. are from the same field of endeavor (method of forming a dielectric layer), the purpose disclosed by Park et al. would have been recognized in the pertinent art of Admitted Prior Art Figure 9 and Chou et al. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the method of forming the dielectric layer of Prior Art Figure 9 by incorporating forming the second dielectric layer of Chou et al. and the deposition rate of Park et al. to obtain excellent deposition and planarization characteristics (abstract).

Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Admitted Prior Art Figure 9, Chou et al. (5,861,345) and Park et al. (5,656,337) as applied to claims 1-5 above, and further in view of Chakravarti et al. (5,909,044).

Admitted Prior Art Figure 9, Chou et al. and Park et al. teach all mentioned in the rejection above. However, Admitted Prior Art Figure 9, Chou et al. and Park et al. fail to teach forming an opening in a substrate. Chakravarti et al. teach forming an opening in a substrate **2** (Figure 2, cols. 3-4, lines 18-27 and 1-67, respectively). Since Admitted Prior Art Figure 9, Chou et al., Park et al. and Chakravarti et al. are from the same field of endeavor (method of forming semiconductor devices), the purpose disclosed by

Chakravarti et al. would have been recognized in the pertinent art of Admitted Prior Art Figure 9, Chou et al. and Park et al. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the method of forming the dielectric layer of Admitted Prior Art Figure 9, forming the second dielectric layer of Chou et al. and the deposition rate of Park et al. by incorporating forming the opening in a substrate of Chakravarti et al. to reduce chip density, size and cost (col. 1, lines 12-28).

Claim 26 is rejected under 35 U.S.C. 103(a) as being unpatentable over Admitted Prior Art Figure 9, Chou et al. (5,861,345) and Park et al. (5,656,337) as applied to claims 1-5 above, and further in view of Lin (5,969,409).

Admitted Prior Art Figure 9, Chou et al. and Park et al. teach all mentioned in the rejection above. However, Admitted Prior Art Figure 9, Chou et al. and Park et al. fail to teach forming a dielectric layer completely filling an opening. Lin teaches forming a dielectric layer **3** completely filling an opening **2** (Figures 2-7, cols. 7-8, lines 48-67 and 1-7, respectively). Since Admitted Prior Art Figure 9, Chou et al., Park et al. and Lin are from the same field of endeavor (method of forming dielectric layers), the purpose disclosed by Lin would have been recognized in the pertinent art of Admitted Prior Art Figure 9, Chou et al. and Park et al. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the method of forming the dielectric layer of Admitted Prior Art Figure 9, forming the second dielectric layer of Chou et al. and the deposition rate of Park et al. by incorporating

forming the dielectric layer completely filling an opening of Lin to decrease process complexity (col. 3, lines 22-36).

Claims 6-13, 19-25 and 27-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Admitted Prior Art Figure 9, Chou et al. (5,861,345) and Park et al. (5,656,337) as applied to claims 1-5 above, and further in view of Jang et al. (5,563,104).

Admitted Prior Art Figure 9, Chou et al. and Park et al. teach all mentioned in the rejection above. However, Admitted Prior Art Figure 9, Chou et al. and Park et al. fail to teach forming first and second dielectric layers through an ozone-TEOS deposition. Jang et al. teach forming first **16** and second **18** dielectric layers through an ozone-TEOS deposition. Jang et al. further teach forming the first dielectric layer at a first process setting and forming a second dielectric layer at a second process setting at a predetermined relationship with the first process setting, wherein the first and second process setting consists of first and second temperatures (Figure 2, col. 2, lines 16-52). Also, it is within the level of ordinary skill to form the first and second dielectric layers at first and second temperatures, pressures, dopant concentrations, dopant flow rates and shower head distances because the first **16** and second **18** dielectric layers of Jang et al. are different thickness which requires different process settings. Since Admitted Prior Art Figure 9, Chou et al., Park et al. and Jang et al. are from the same field of endeavor (method of forming dielectric layers), the purpose disclosed by Jang et al. would have been recognized in the pertinent art of Admitted Prior Art Figure 9, Chou et

al. and Park et al. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the method of forming the dielectric layer of Admitted Prior Art Figure 9, forming the second dielectric layer of Chou et al. and the deposition rate of Park et al. by incorporating forming the ozone-TEOS layers of Jang et al. to find a method of forming a high quality ozone-TEOS layer with reduces pattern sensitivity (col. 1, lines 52-54).

Response to Arguments

Applicant's arguments with respect to claims 1-31 have been considered but are moot in view of the new ground(s) of rejection.

In regards to the remarks on pages 11-12, last and first paragraphs, respectively, the two different dielectric layers could have been formed by varying temperatures, pressures, dopant concentrations, etc. due to the nature of exhibiting different thickness.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

The following patents have been cited to further show the state of the art with respects to a method of forming dielectric layers:

Kocmanek et al. (5,252,520) Nakatani et al. (5,577,021)

Reinberg (5,976,947).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ida M Soward whose telephone number is 703-305-3308. The examiner can normally be reached on Monday - Thursday, 6:30 am to 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on 703-308-4905. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9318 for regular communications and 703-872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

ims
March 6, 2003

AMIR ZARABIAN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800